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GEOLOGY.—*A spiral graph of geologic time.*[1] DAVID WHITE, U. S. Geological Survey.

While the astronomer teaches the immensity of space, it falls to the geologist to cultivate the conception of geologic time. It is a task he owes to society, for some understanding of geologic time as well as of cosmic distance is an essential part of the background of any well-balanced philosophy of life. In conveying the idea of geologic time mere figures too often lose value with the student as well as the layman. Greater success is reached when the mental image envisages a picture in which numbers are coördinated with some graphic scale. Block diagrams may reflect contrasts in magnitude, but they fail in the attempt to represent geologic length of time. Straight-line horizontal diagrams in normal orientation and clock dial graphs, while passably effective, plunge the layman into the long dark pre-Cambrian, shrouded in greatest ignorance and uncertainty, with the probable result that his first impression of geologic knowledge, as well as time, is unfavorable. Only as the end of the line or the later hours of the dial are approached, the differentiative information becomes more and more exact as well as more complete. The dial has its good psychological points, but the eye travels along the endless circle to pass from the Recent again into the misty Azoic. The trouble with the geologic time graph lies mainly in its beginning and in the pre-Cambrian epochs.

The object of this note is to present an appropriate, stimulating, and more adequate form of graph for use in developing the mental picture of the lapse of geologic time and superposed geologic history. It is offered to illustrate a method, rather than definite conclusions.

[1] Received February 16, 1928.

Borrowing the idea from some recent photographs of spiral nebulae—the mothers of multiple solar systems—I have partly unwound a closely coiled spiral to form the basis of the picture. Vision of the origin and earliest history of the earth is hidden in obscure and uncertain remoteness. The spiral is so complexly intricate that not even the number of turns, and, so, the length of the time line can be discerned. Gradually the line becomes clearer, and presently one meets more or less definitely known, though perhaps distantly isolated and unrelated facts. As the coils roll wider out into clearer view the information increases in amount and diversity, and the historical record unfolds in ever growing distinctness, detail and definiteness of relations. Finally, the mind runs into the impressive facts that Recent time is incredibly brief and that the drama of the evolution of earth and life is still going on.

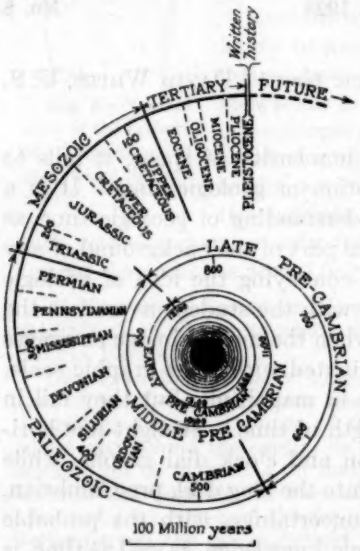

Fig. 1.—Graph illustrating geologic time and the evolution of earth's history.

In Figure 1 the numbers in hundreds (of millions of years) on the spiral accord approximately with and are adjusted to the results reached by Arthur Holmes and A. C. Lawson (Am. Journ. Sci., April, 1927), through (1) the recalculation of the formula for determining the ages of the uranium-bearing rocks by means of viewing the proportions of uranium and uranium lead with reference to the rate of decomposition of the radioactive minerals, and (2) the revisory computation of the ages of a considerable number of uraniferous rocks. In some of these calculations attention was given to thorium lead as well as radium lead. Not all the Holmes-Lawson determinations, most of which relate to Paleozoic and pre-Cambrian rocks, in many cases very indefinitely correlated, were used. The others, and still others to come, may be intercalated by the geologist who may be interested in the measurement of geologic time. The pre-Cambrian time classification is that given by the cited authors. This is the skeleton of the graph.

In laying off the accepted divisions of geologic time one million years was adopted for the Pleistocene, 60 millions for the Tertiary, and so on, in more or less agreement with the calculations by Barrell, Schuchert, and others as to relative length. The demarcation of the periods and epochs is subject to revision to suit the user's convictions.

This geologic time graph lends itself to the uses of geologists whether the object be to show the sequence and duration of the time divisions, the sequence of life, the glacial epochs, the periods of volcanism or diastrophism, or other features or time relations in earth's history.

The curve should be redrawn in better balance proportions.

BOTANY.—*The grass genus* Schizachne.[1] JASON R. SWALLEN, Bureau of Plant Industry. (Communicated by A. S. HITCHCOCK.)

The generic position of one of our native grasses, at present known as *Melica purpurascens*, has been somewhat uncertain. It was first described from North American by Michaux as *Avena striata* and later by Torrey as *Trisetum purpurascens*. From Siberia it was described by Ledebour as *Avena callosa* and from Sachalin Island by Hackel as the type of a new genus, *Schizachne*, which he compared with *Festuca* and *Bromus*. Hitchcock transferred it to *Melica* and Farwell to his new genus *Bromelica*.

An examination of *Melica purpurascens* leads to the conclusion that the species is generically distinct. The texture of the glumes suggests *Melica* but the bearded callus, the strongly nerved lemma, bifid at the apex, the divergent awn, and the brown smooth shining caryopsis are characters not possessed by any species of *Melica* of the section *Bromelica* to which the species is more closely allied than to *Festuca* or *Bromus*. Furthermore the innovations are extravaginal, while those of the section *Bromelica* are intravaginal and the culms are often bulbous at the base.

The species under consideration shows affinities with *Bromus* but the styles are exactly terminal and the caryopsis is entirely free from the palea while in *Bromus* the styles arise below the apex and the caryopsis is adherent to the palea. It also resembles species of *Festuca* but its bifid lemma and bearded callus exclude it from that genus. It differs from *Melica smithii* (Porter) Vasey, which has been grouped with it, in the bearded callus, the more deeply bifid lemma and the smooth caryopsis.

[1] Received February 4, 1928.

In view of these differences it seems best to segregate the species as the type of a distinct genus, taking up the name *Schizachne* Hack.

The geographic distribution of *Schizachne*, which is monotypic, is similar to that of a number of species mentioned by Asa Gray,[2] being found in northern North American and eastern Asia. This distribution was recognized as early as 1842 by Turczaninow[3] who referred his collections, later described as *Avena callosa*, to *Avena striata* Michx. Hultén,[4] in his Flora of Kamtchatka, also states that Asiatic specimens agree completely with the American ones.

Schizachne Hack.

Spikelets several-flowered, articulate above the glumes and between the florets, the rachilla glabrous; glumes unequal, 3 and 5-nerved respectively; lemma lanceolate, strongly 7-nerved, long-pilose on the callus, awned from just below the teeth of the prominently bifid apex; palea with softly pubescent, thickened submarginal keels, the hairs longer toward the summit; ovary glabrous, the styles exactly terminal; caryopsis dark reddish brown, very smooth and shining. Type species, *S. purpurascens*.

Schizachne purpurascens (Torr.)

Avena striata Michx. Fl. Bor. Amer. **1**: 73. 1803. Not *Avena striata* Lam. Collected by Michaux "a sinu Hudsonis ad Lacus Mistassins." Type in Muséum d'Histoire Naturelle at Paris. A fragment in the U. S. National Herbarium has been examined.

Trisetum purpurascens Torr. Fl. North. & Mid. U. S. **1**: 127. 1823. A cited specimen in the Torrey Herbarium, at the New York Botanical Garden, has been examined. It is labeled in Torrey's handwriting, "Trisetum purpurascens Tor. fl. near Montreal."

Avena callosa Turcz. in Ledeb. Fl. Ross. **4**: 416. 1853. "Catal. Baic. nr. 1295" is cited. Judging from the description and a specimen from "Vallis U-scha-gon, Siberia," *Kamerov* 163, there is no doubt that this is identical with *Schizachne purpurascens*.

Avena striata forma *albicans* Fernald, Rhodora **7**: 244. 1905. "Quebec, abundant on mossy tableland, altitude 900–1500 meters, Mt. Albert, Aug. 9, 1905." [*Collins & Fernald* 26] The characters are not sufficient to distinguish it from the species.

Melica striata (Michx.) Hitchc. Rhodora **8**: 211. 1906. Based on *Avena striata* Michx.

Melica purpurascens (Torr.) Hitchc. Contr. U. S. Nat. Herb. **12**: 156. 1908. Based on *Trisetum purpurascens* Torr.

Schizachne fauriei Hack. Repert. Sp. Nov. Fedde **7**: 323. 1909. "Insula Sachalin, in silvis prope Korsakof, Faurie 803." A portion of the type from the Hackel Herbarium has been examined.

[2] Proc. Amer. Assoc. **21**: 1–31. 1872.

[3] Bull. Soc. Nat. Moscou **15**: 16. 1842.

[4] *Flora of Kamtchatka and the Adjacent Islands* **1**: 118. 1927.

Avena torreyi Nash in Britt. & Brown, Illustr. Fl. ed. 2. 1: 219. 1913. Based on *Trisetum purpurascens* Torr. Not *Avena purpurascens* DC.

Bromelica striata (Michx.) Farwell, Rhodora 21: 77. 1919. Based on *Avena striata* Michx.

DESCRIPTION

Perennial herb; culms erect from a loose decumbent base, the innovations extravaginal; panicle simple, about 10 cm. long, the branches one or two together, more or less drooping, bearing one or two spikelets.

DISTRIBUTION

Dry, moist, or rocky woods and open places, in North America from Labrador to Alaska, south in the United States to Pennsylvania, Indiana, and in the mountains to South Dakota and New Mexico; also in Asia from Kamtchatka and Sachalin Island, west to Lake Baical.

The following specimens are in the U. S. National Herbarium:

NEWFOUNDLAND: Quarry, *Fernald & Wiegand* 4608. Frenchman's Cove, *Mackenzie & Griscom* 10077.

QUEBEC: Island of Anticosti, *Marie-Victorin, Brunel, Rolland-Germain & Louis Marie* 20546, 20547. Mount Albert, *Macoun* 40; *Marie-Victorin, Brunel, Rolland Germain & Rousseau* 17787. St. Anne River, *Allen* in 1881; *Marie-Victorin, Brunel, Rolland-Germain & Rousseau* 17762. Mount au Clair, *Fernald & Smith* 25, 464. Gaspé, *Marie-Victorin, Brunel, Rolland-Germain & Rousseau* 17768. Rivière Cap Chat, *Fernald, Griscom, Mackenzie, Pease & Smith* 25463. Longueuil, *Marie-Victorin* 3006. St. Jerome, *Victorin* 3007. Lac Tremblant, *Churchill* in 1922. Ville-Marie, *Marie-Victorin* 8040.

ONTARIO: Vicinity of Ottawa, *Rolland* 6089. Galt, *Herriot* in 1898 and 1901. Jones Falls, *Fowler* in 1895. Tilsonburg, *Macoun* 26077. North Shore of Lake Superior, *Wood* 20; *Macoun* in 1869.

MANITOBA: Carberry, *Macoun & Herriot* 42909.

SASKATCHEWAN: "Portage La Prairie," *Macoun* 122. Prince Albert, *Macoun* 13025.

ALBERTA: Red Deer River, *Brinkman* 2199. Calgary, *Macoun* 18631. Edmonton, *Hitchcock* 11390. Athabasca Landing, *Hitchcock* 11411. Jasper Park, *Macoun* 98208. McMurray, *Raup* 143, 147.

Fig. 1.—*Schizachne purpurascens*. Spikelet, floret, summit of lemma, palea, and caryopsis, × 5.

BRITISH COLUMBIA: Field, *Hitchcock* 11538. Lucerne, *Macoun* 98203. Hazelton, *Henry* 6.

ALASKA: Kenai, *Piper* 4715.

MAINE: Aroostook County, *St. John & Nichols* 2148. Fort Kent, *Knight* 9; *Fellows* 2550. Somerset County, *St. John & Nichols* 2146, 2147. Farmington, *Knowlton* in 1911. Orono, *Fernald* in 1893; *Harvey* 1299. Mount Katahdin, *Fernald* in 1900. "Mt. Clifton," *Briggs* 21.

NEW HAMPSHIRE: Shelburne, *Deane* in 1915. Jefferson, *Booth* in 1873. Mount Washington, *Eggleston* in 1898; *Hitchcock* 16042; *Greenman* 1282. White Mountains, *Faxon* in 1878. Franconia, *Booth* in 1855.

VERMONT: Lyndon, *Congdon*. Cabot, *Knowlton* in 1915. Burlington, *Flynn* in 1901 and 1902. Charlotte, *Eggleston* in 1892; *Hosford* 487; *Pringle* in 1877 and 1878. Rutland, *Kirk* 983. Townshend, *Wheeler* in 1912.

CONNECTICUT: Salisbury, *Bissell* in 1901; *Weatherby* 3629.

NEW YORK: North Elba, *Peck* 10. Canton, *Phelps* 154. Lebanon Springs, *Harrison* in 1890. Arkville, *Chase* 7444, 7451. Jamesville, *Chase* 7490½. McLean, *Dudley* in 1881 and 1884. Ithaca, *Metcalf* 1617; *Pearce* in 1884. Chemuga County, *Lucy* 1055.

PENNSYLVANIA: Loyalsock, Sullivan County, *Smith* 1864.

INDIANA: Logansport, *Deam* 38375.

MICHIGAN: Chippewa County, *Dodge* in 1914. Mackinac County, *Dodge* in 1912 and 1915. Schoolcraft County, *Dodge* in 1915. Douglas Lake, *Ehlers* 405. Port Huron, *Dodge* 25, and in 1904. Lansing, *Wheeler* in 1887. Grand Rapids, *Mulliken* in 1896.

WISCONSIN: Hurley, *Random* in 1896. Green Bay, *Schuette* in 1878. Bellevue, *Schuette* in 1882. Winnebago County, *Kellerman*.

MINNESOTA: Gull Lake, *Anderson* in 1893. Minnehaha Falls, *Minns*.

NORTH DAKOTA: Devils Lake, *Lunell* in 1902 and 1913.

SOUTH DAKOTA: Custer, *Hitchcock* 11131; *Rydberg* 1132. Nahant, *Hayward* 2412. Elmore, *Hayward* 1848.

MONTANA: Columbia Falls, *Williams* 823 in 1894. Belt Creek, *Scribner* 371. Barker, *Rydberg* 3363. "Lower Belt Pass," *Williams* 823 in 1889.

WYOMING: Sundance, *Griffiths* 455, 890; *Williams* 2637. Little Missouri Buttes, *Griffiths* 575. Clear Creek, *Williams & Griffiths* 13, 86. Yellowstone National Park, *Tweedy* 612.

COLORADO: Pikes Peak, *Hitchcock* 1718, 1748. La Plata Mountains, *Baker, Earle & Tracy* 976. Upper La Plata, *Tracy* 4304. "Crystal Park" *Clements* 173 in 1901.

NEW MEXICO: Pecos River National Forest, *Standley* 4185. Cowles, *Hitchcock* 22965.

SACHALIN ISLAND: Korsakof, *Faurie* 803.

JAPAN: Hokkaido, *Yushun Kudo* in 1907.

SIBERIA: Kamtchatka Peninsula, *Kamarov* in 1909. Vallis Uschagon, *Kamerov* 163.

BOTANY.—*Some errors and mistakes in taxonomic botany.*[1] H. PITTIER, Caracas, Venezuela.

Botanists, like all other mortals, are subject to errors and mistakes. Few of those, for instance, who have had to describe a large number of

[1] Received March 1, 1928.

plants have been exempt from them. Many times, they are the result either of a previous description obscurely written or of a different valuation of specific characters. In other instances, species have been too hastily founded on decidedly scant materials. In all cases, the result is the inconvenience caused by a useless encumbrance of synonyms.

Other mistakes are more serious and perhaps less easy to condone. I will cite only one case, besides those which are to be rectified in this article. In a splendid work entitled *Florae Columbiae terrarumque adjacentium specimina selecta*, Karsten described his *Siphoniopsis monoica*, founded on the African *Cola acuminata* R. Br.! This tree, brought to Venezuela by negro slaves, is quite naturalized in some places and found in situations that preclude the suspicion of its being an introduced species, so that Karsten's error can be easily understood.

In two cases my own mistakes were undoubtedly much worse. In 1913, I collected at Cárdenas, Siquire Valley, in the State Miranda, Venezuela, specimens of a tree which I determined as a new species of *Monopteryx*, a genus created by Spruce and including two distinct types growing in the Upper Rio Negro. While studying and describing that supposedly new species, I could not but be struck by certain apparent discrepancies in Spruce's definition of the genus. My observations were recorded in a short paper in 1915.[2] Comparing the newly described *Monopteryx Jahnii* with the original species, I concluded that Spruce's species were based on immature flowers and that the fruits could not be drupelike, as originally supposed. Accordingly I offered an emended generic diagnosis. As an extenuating circumstance it may be explained that the genus *Monopteryx* was not represented at the time in the U. S. National Herbarium, and that my specimens looked very much indeed like the full size drawing in plate 122, vol. 15, 1, of the *Flora brasiliensis*. Relying on the characters of the supposed new species, I made another mistake in proposing to transfer the genus in question from the *Sophorae* to the *Pterocarpinae*.

A few years ago, Dr. H. Harms, of the Berlin Botanical Museum, suggested that my no. 6005, type of *Monopteryx Jahnii*, might in reality be none other than *Fissicalyx Fendleri* Benth., a Venezuelan monotypic genus of the *Geoffreainae*, which assumption was at once confirmed by my finding in the Venezuelan National Herbarium specimens of the same species from the vicinity of Hacienda de Cura,

[2] Bull. Torrey Club 42: 623–627. *fig. 1, 2.* 1915.

near San Joaquín in the State of Carabobo (*Pittier* no. 7738), and from Hacienda Cárdenas, where the original specimens of *M. Jahnii* were collected (*Pittier* no. 7072), rightly labelled by myself this time, as *Fissicalyx Fendleri* Benth. Consequently, *Monopteryx Jahnii* Pittier is to be relegated to the synonymy of the above Venezuelan monotype.

The second of my botanical sins which I wish to atone for is that of the hasty publication of *Adenocalymna anomalum* Pittier,[3] the specific name of which referred to the bipinnate leaves. Here, the blunder is perhaps still less pardonable, because before publishing new species of the vast family Bignoniaceae, I should have known that among the Sub-family Bignonieae, there are two Venezuelan genera, and only two, *Memora* and *Pleonotoma*, with pluripinnate leaves. In the first one the stems and branchlets are terete and the tendrils simple, in the second they are tetragonous with sharp detachable angles, formed by black sclerom strings. Subsequent to the description of *Adenocalymna anomalum* both genera have been mixed together under the same cover, but my pseudo-new species, which I have not at hand, was presumably *Memora caracasana* K. Schum., while among the species with sharp cornered stems and branchlets we have *Pleonotoma variabile* Miers.

A third mistake of mine consisted in the publication, in my "*Arboles y arbustos nuevos de Venezuela*" (p. 58, 1925), of a supposed new species under the name of *Coursetia caracasana*. First, this small tree is not a *Coursetia*, and secondly, it had already been described, practically from the same locality, under the name of *Robinia ferruginea* H. B. K.[4] I was led to this too hasty publication by the fact that two different species, the above one and *Coursetia arborea* Grisebach, which commonly grow together and resemble each other at first glance when leafless, were often mixed together in herbaria. In 1923, Dr. Harms of the Berlin Botanical Museum, an acknowledged authority on leguminous plants, already cited above, published his *Humboldtiella ferruginea*, supposedly to replace *Robinia ferruginea* H. B. K. When comparing the specimens of the tree collected by me with Dr. Harms' description, I found wide discrepancies and so jumped to the erroneous conclusion that I had on hand a *Coursetia*, which, however, could not be *C. arborea* of Grisebach; hence the new name.

Later, when revising the Papillionatae of the Venezuelan Herbarium, I was surprised to find that, among the numbers cited by Dr. Harms

[3] Contr. U. S. Nat. Herb. **18**: 254–255. 1917.
[4] Nov. Gen. & Sp. **6**: 395. 1823.

as belonging to his *Humboldtiella*, one (no. 5780) apparently corresponds to *Gliricidia sepium* H. B. K., another (no. 9078) is unmistakably *Coursetia arborea* Griseb., and only one (no. 6004) belongs to the real *Robinia ferruginea* H. B. K., as do also additional collections under nos. 10310, 10375, 11956, and a few more. It would seem that Dr. Harms did not draw the generic characters of his *Humboldtiella* from a single type, but from all the materials cited by him, giving perhaps most weight to *Coursetia arborea* Grisebach. This would explain in a large measure my own mistake. After a careful study of the whole matter I have come to the conclusion that my *Coursetia caracasana* is the topotype of *Robinia ferruginea* H. B. K. and that the only character which would exclude the plant in question from *Robinia* is the absence of a conspicuous margin on the upper suture of the pod, which would certainly not be sufficient to establish a new genus.

The above facts were submitted to Dr. Harms, who with the utmost good grace accepted them with the exception of the part relating to the supposed *Gliricidia*, and agreed that, for the present, Humboldt & Bonpland's name had better be retained. I must admit, finally, that, as far as the general habit and macroscopic characters are concerned, there is little resemblance between our *Robinia ferruginea* and *Robinia pseudo-Acacia*, the only other species of the genus with which I am familiar.

The following is a full description of our *Robinia*, from specimens proceeding from the Tacagua valley, where the original plant was collected by Bonpland in imperfect specimens.

ROBINIA FERRUGINEA H. B. K., Nov. Gen. & Sp. **6**: 395. 1823.

Humboldtiella ferruginea (H. B. K.) Harms, Repert. Nov. Sp. Fedde **19**: 12. 1923.

Coursetia caracasana Pittier, Arb. y. arbust. nuev. Venez. 58. 1925.

Arbor parva, ramulis plus minusve griseo-pubescentibus, gemmis novellis, petiolis, petiolulis, pedunculis pedicellisque ferrugineo-tomentosis; foliis elongatis, imparipinnatis, plerumque 21-foliolatis, petiolulis gracilibus, suboppositis vel alternis, laminis elliptico- vel oblongo-lanceolatis, basi inaequalibus rotundatis apice acutis subacutisve, supra glaberrimis pallide viridis, costa impressa, subtus praecipue ad costam costulisque prominentibus molliter ferrugineo-pubescentibus; stipulis lineari-setaceis, subpungentibus, rigidis, ad apicem ramulorum persistentibus; racemis pedunculatis, pluriforibus praecocibus vel foliis subcoaetaneis, solitariis, vel rarius geminis; floribus longe pedicellatis; calyce basi articulato, subulato, extus ferrugineo-tomentello, intus superne et margine albido-villoso, dentibus subaequantibus, obtusis; petalis glaberrimis, vexillo transverse ovato, basi flavi-maculato,

auriculato callosoque, apice emarginato, reflexo; alis longiuscule unguiculatis, lamina distincte obovata, basi intus leviter auriculata; petalis carinalibus vexillo alisque brevioribus, dorso breviter cohaerentibus breve unguiculatis, lamina late falcata, apice subacuta; staminibus 10, filamentis connatis, vexillari basi apiceque libero, utrinque capillaceo-linearibus, uninervibus, alterne brevibus longioribusque; ovario breviter stipitato, cinereo-tomentello; stylo basi glabro apicem versus utrinque villosulo; legumine subsessili, pedicellato, maturo ferrugineo-tomentoso, calyce persistente suffulto et stylo terminato.

Arbor 4–6 m. alta. Petiolum 4–10 cm. longum, supra leviter sulcatum; petioluli 1.5–2 mm. longi; laminae 1.3–3.5 cm. longae, 0.6–1.1 cm. latae. Stipulae 3–4 mm. longae. Racemi 2.5–8 cm. longi; pedicelli 5–9 mm.; flores circa 1.5 cm. longi; vexilli unguiculus 2–2.5 mm. longus, lamina circa 1.4 cm. longa, 1.7–1.8 cm. lata; alarum unguiculus 4.5 mm. longus, lamina 13 mm. longa, 8–9 mm. lata; carina 12–13 mm. longa (cum unguiculo 3 mm. longo), 5–6 mm. lata. Ovarium 9–10 mm. longum; stylus 5 mm. Legumen 10–12.5 cm. longum, circa 1 cm. latum; pedicellum 0.8–1 cm.

VENEZUELA: Quebrada de Tacagua (altitude about 720 m.) (*Bonpland*, type of the species); Caracas, January 1843 (*Moritz* 223); Escuque, Trujillo (*Moritz* 1431). Puerto Cabello, May 1874 (*O. Kuntze* 1742); Cárdenas, Siquire Valley, Miranda, 500 m., March 1913 (*Pittier* 6004); near El Consejo, Aragua, in bushes, flowers and young fruits, January 15, 1921 (*Pittier* 9159); near Las Trincheras, 900 m., valley of Tacagua, D. F., flowers May 4, pods and leaves, June 15, 1922 (*Pittier* 10310, 10375, type of *Coursetia caracasana* Pittier); Los Mariches, Miranda, in dry bushes, flowers and young leaves, November 22, 1924 (*Pittier* 11956).

TRINIDAD: *Broadway* 1431; *O. Kuntze* 1884.

Cited also from Guiana, Brazil and Panamá, but there are no data at hand to verify the identifications.

In the course of the investigations necessitated to undo the above imbroglio, dissections of the flowers of the several species in question were made. When comparing the details of those of the so-called *Coursetia arborea* Grisebach with the descriptions of genus *Coursetia* I became very doubtful as to whether this species could really be included in it. The shrubs of this group are generally more or less tomentose, often glandulous, and sometimes armed. The calyx is described as having its five teeth subequal, elongate and acute, with the two superior ones hardly connate at the base. The ovary and style are hairy in all species and the pods are more or less constricted between the seeds. The details concerning the calyx and the ovary were confirmed by the dissection of flowers of three species of Mexico and Arizona kindly sent by Dr. F. S. Blake. The calyx of *C. arborea*, on the other hand, is of very different shape, having short teeth, the two superior united almost to the tip, the lateral ones smaller and more or less acute, and the inferior one again slightly longer and sharply pointed; besides, the pubescence is hardly perceptible, while in the

true species of *Coursetia* the same part is often tomentose, with the indument intermingled with glandular hairs, especially conspicuous on the margin of the segments. The shape of the petals is also different, the base of the wings and carinal petals being distinctly semi-auriculate in *C. arborea*, while it is more or less rounded or attenuate in the three species of supposed true *Coursetia* I had the opportunity to examine. But it is in the gynoecium, perhaps, where we find the most significant difference. In the three species of *Coursetia*, it is, as we just mentioned, prominently hairy and often glandulous, and either sessile or short-stipitate; the style is mostly long-arcuate and probably always ends in a capitellate stigma. In the Venezuelan species the same organ has a striking appearance: the ovary is long, smooth and long-stipitate; the style seems to be distinctly articulated on this and, after a short curve downward, bends sharply again and continues upward, long, straight and needle-like, its upper side hairy all around, and ends in a cone-shaped stigma. This character and the details of the calyx would, it seems, be sufficient to exclude the species from *Coursetia*. But we have cited other important divergences and will add that neither are the pods of our tree like those of *Coursetia*. I propose, therefore, to segregate *Coursetia arborea* Grisebach under the name *Callistylon arboreum* (Griseb.) Pittier, with the following description:

Callistylon Pittier, gen. nov.

(*Coursetia* sp., Griseb.)

Calyx late cupulatus, basi rotundatus, dentibus inaequalibus, 2 superioribus alte connatis obtusis, lateralibus brevioribus plus minusve acutis, inferiori acuto, lateralibus longiori. Vexillum suborbiculatum quam longius latior, basi emarginatum et subauriculatum, apice emarginatum, marginibus reflexis, unguiculo longiusculo, lamina basi intus obliquo vel fere rectangulari; alae falcato-oblongae, latae, semi-auriculatae, plus minusve conchoideae, apice rotundatae, longe unguiculatae; carina lata, alis brevior, pariter longe unguiculata, valde arcuata et longe rostrata, petalis pars dimidia superiora cohaerentibus. Stamina 10, inaequalia, vexillari basi et apice libero; antheris oblongis. Ovarium crasse stipitatum, 15–22 ovulatum, stylo basi crasso, glabro, geniculato, sursum abrupte curvato, parte superiora verticali longa, filiformi, apicem versus adpresse villosa; stigmate punctiformi. Legumen vix stipitatum, lineare, compressum, polyspermum, continuum, dehiscente, valvis convexis, apice stylo persistente producto; semina parva, nigra, lenticularia—Arbor parva, inermis. Folia abrupte pinnata, foliolis 12–18, petiolulatis, ovalibus, apice emarginatis mucronatisque, mucronulis fugacibus, primum oppositis demum plus minusve alternis, petiolo apice mucronato. Stipulae setaceae, rigidulae, sub-persistentibus; stipellae nullae. Racemi terminales vel folia superior axillares, haec breviores, multiflorae, pedicellis flores aequantibus vel longioribus, basi apiceque articulatis. Bracteae

breves, lanceolatae; bracteolae parvae et inconspicuae. Flores albi, ima magni.

CALLISTYLON ARBOREUM (Griseb.) Pittier.

Coursetia arborea Griseb., Fl. Brit. W. Ind. 183. 1864.

Humboldtiella ferruginea (partim) Harms, Repert. Nov. Sp. Fedde **19:** 12. 1923.

Arbor parva, ramulis cinereis, tortuosis, novellis rufo-pubescentibus; foliis paripinnatis, stipulatis, glabris glabrescentibusve, petiolo gracili, basin versus leviter incrassato, canaliculato, apice mucronato, foliolis 6–9-jugis, membranaceis, petiolulatis, petiolulis saepe pilosulis, exstipellatis, laminis ovatis obovatisve, integerrimis, basi vix inaequalibus rotundatisque, apice mucronulatis primum late obtusis in aetate emarginatis, supra laete viridibus, glaberrimis, minute reticulatis, subtus pallidioribus, juveniis interdum pilosulis demum glaberrimis, costa prominente, et caeteris prominuliter reticulatis; stipulis minutis, setaceo-spinescentibus, villosulis; racemis pedunculatis, 8–15-floribus, pedunculo pedicellisque rufo-pubescentibus, pedicellis gracilibus, elongatis, postea floribus persistentibus; calyce cupulato, costulato, parce pubescenti; vexillo interdum pilosulo; alis liberis, unguiculo arcuato; petalis carinalibus basi liberis, parte superiore cohaerentibus; filamentorum pars libera tenuissima; ovario glabro vel glabriusculo. Legumine elongato primum ferrugineo-pubescenti demum glaberrimum, marginibus vix incrassatis.

Arbor 2–4 m. alta. Petiolus 5–10 cm. longus; petioluli tereti 2–3 mm. longi; laminae foliolorum 1.5–4.7 cm. longae, 1–2 cm. latae. Stipulae circa 2 mm. longae. Racemi cum pedunculo circa 2 cm. longo 3–5 cm. longi, pedicelli 1–2 cm. longi. Flores circa 2 cm. longi. Calyx 7 mm. longus. Vexillum 15 cm. longum, 19–22 mm. latum, unguiculo 5 mm. longo; alarum laminae 17 mm. longae, 8–9 mm. latae, unguiculo 4–t mm. longo; carinae unguiculum circa 3 mm. longum, lamina horizontaliter 11 mm. longa, verticaliter cum rostro 11 mm. longa. Ovarium 11 mm. longum, stylo parte horizontali 2.5 mm., verticali 8 mm. longa. Legumen 10–12 cm. longum, 0.9–1.2 cm. latum.

VENEZUELA: Vicinity of El Palito, in dry hills, 100 m., Aragua, rare, flowers September 24, 1920, fruits, Dec. 1920 (*Pittier* 9078, 9413); La Ciénega, near Valera, 550 m., Trujillo, in arid bushes, fruits, Nov. 24, 1922 (*Pittier* 10780); near El Sombrero, 130 m., Guárico, in thorn bushes, flowers and fruits (but no leaves and the latter narrower than in the type and quite glabrous), February 19, 1924 (*Pittier* 11447); near Curucutí, 300 m., D. F., on rocky slopes, flowers, August 7, 1927 (*Pittier* 12423); Humocaro, 1000 m., Lara, flowers September 25, 1922 (*Jahn* 1197); Puerto La Cruz, D. F., October 1926 (*Voronoff* 335); La Ruesga near Barquisimeto, 550 m., flowers, May and June 1925 (*Saer* 230, 247).

PLANT ECOLOGY.—*Northward range-extensions of some southern orchids in relation to soil reaction.*[1] EDGAR T. WHERRY, Bureau of Chemistry and Soils.

In this note it is proposed to discuss six southern terrestrial orchids, notable extensions of the ranges of some of which have recently been

[1] Received January 23, 1928.

discovered: *Cleistes divaricata* (L.) Ames (often classed as a species of *Pogonia*); *Habenaria conspicua* Nash; *Habenaria integra* (Nutt.) Sprengel; *Hexalectris spicata* (Walt.) Barnhart; *Malaxis spicata* Swartz (also known as *M. floridana*); and *Ponthieva racemosa* (Walt.) Mohr. These are classed as "southern" because they are widespread in Florida and in the Coastal Plain physiographic province in neighboring States, but in more elevated provinces, as well as at sea-level farther north, they become so rare and local as to make publication of the finding of new stations worth while. No attempt is made to assign them to any "life-zone," because in the southeastern part of the United States these zones are about as lacking in significance as are those in eastern Canada.[2]

The Rosebud Orchid,[3] *Cleistes divaricata*, extends northward locally beyond its area of abundance, or, as this may be called, its "normal" area, as far as New Jersey on the Coastal Plain, whereas on the Piedmont red-clay soils it seems unable to migrate beyond Georgia. In central Alabama, where sandy soils derived from Paleozoic formations come into contact with the Coastal Plain sands, it again pushes northward far beyond its normal area. In the mountains of North Carolina it is known to grow up to elevations of 1,200 meters (3,900 feet). It has not been heretofore recorded farther northwest, but was found in September, 1927, by Dr. Francis W. Pennell and the writer on a dry ridge near Honeybee Post Office, Pulaski County, Kentucky. A specimen is in the Academy of Natural Sciences, Philadelphia.

The orange colored species known from the shape of its flowers as the Frog-arrow Orchid, *Habenaria integra*, shows a similar but more restricted range. It too has reached New Jersey on the Coastal Plain, but apparently it has not been able to extend north on either the Piedmont or the Blue Ridge province. The sands of the Appalachians furnish a route for its migration, however, and it grows at least as far up as south-central Tennessee.[4]

[2] FERNALD, Rhodora 23: 169. 1921.

[3] Botanists often derive "common names" for plants by anglicizing the specific name and changing a letter or two in the generic name. To the writer names so derived seem pedantic and needless, for they are never used by anyone not thoroughly acquainted with the technical name itself. An effort has here been made to introduce common names which either are in actual use, or can be understood, by laymen. The name chosen for the present species may seem a bit far-fetched, but the lip of the flower does bear some slight resemblance in color and form to a slender rose bud, and this name means much more to the natives of the regions where the plant occurs than would "Divaricate Cleistia."

[4] GATTINGER, *Flora Tennessee* 62. 1901.

The Longspur Fringe-orchid, *Habenaria conspicua*, is another example of the same general behavior. In its case there appears to have been no migration beyond the normal area on the Coastal Plain, but it does follow the Appalachians, and a form of it with the lip entire was found by Dr. Pennell and the writer in September, 1927, about 5 kilometers south of Pine Knot, Whitley County, Kentucky, this bringing it within the limits of floras of the northeastern part of the United States. A specimen of this is now in Academy of Natural Sciences, Philadelphia.

All three of these plants grow far enough north and at high enough elevations to show that they are reasonably hardy, so the question arises as to why they are limited to very restricted areas beyond their normal region. It is not a matter of moisture, for the first appears to thrive equally well in meadows which are under water half the year and on the dryest kind of gravelly mountain slopes, and the other two show distinct variation in the wetness of their habitat. It is not connected with soil temperature, for while it is true that sandy soils such as these species occupy are often considered to be "warm," the bogs in which they are usually found are generally recognized to be "cool" places. Indeed, as pointed out by Fernald,[5] in Newfoundland southern species often occupy colder places than do northern ones, the explanation being that extensive areas of acid soil occur in an especially cold part of the island, and the southern species concerned are acid-soil plants. The one feature which the various soils supporting these orchids have in common is a high degree of acidity. A simple explanation of their isolation is, then, that beyond their normal areas these species are able to withstand the more or less unfavorable environmental conditions only when particularly well nourished, and their physiology chances to be such that they can best obtain the nutriment they require in strongly acid soils, which are only locally well developed in situations where the plants can grow at all.

The distribution of the Crested Coralroot Orchid, *Hexalectris spicata*, has already been discussed.[6] It crosses the Virginia Coastal Plain along marl outcrops, and even extends into Maryland on an Indian shell-heap. Farther west it reaches fairly high elevations in the mountains of Virginia, and enters Indiana, where the climate is by no means mild. Though occasionally growing in acid upland peat, it becomes luxuriant only in relatively rich soils.

[5] FERNALD, Amer. Journ. Bot. 5: 237. 1918.
[6] WHERRY, This JOURNAL 17: 35. 1927.

The little brown-flowered orchid, which is best characterized as the Two-leaf Adder's-mouth, *Malaxis spicata*, has not heretofore been reported as growing north of Florida. That its range was wider by two States was shown when it was found by Mr. H. W. Trudell and the writer in June, 1922, near Monck's Corner, Berkeley County, South Carolina, growing in marl thrown out in the digging of the Santee Canal. A specimen has been placed in New York Botanical Garden. In August, 1927, an additional two-State extension of range was indicated when it was discovered in southern Gloucester County, Virginia, by Miss Jennie S. Jones, of Richmond. A specimen of the orchid found by Miss Jones is in the United States National Herbarium. Another colony was found a month later near Williamsburg, Virginia, by Mr. E. A. Eames, of Buffalo, New York. In both these places the plant grows in rich soil where marl outcrops near ravine-bottoms.

The Shadow-witch Orchid, *Ponthieva racemosa*, was apparently collected in Virginia by Clayton, for Gronovius[7] listed a "SERAPIAS *foliis ovatis radicalibus, scapo nudo multifloro.* Orchis s. Bifolium aquaticum autumnalis flore herbaceo, caule aphyllo, foliis subrotundis plantagineis, radice palmata. Clayton 1 & 138" which clearly describes this species. It was then lost sight of for more than 150 years, until it was rediscovered by the late E. J. Grimes[8] in 1920. The writer has observed it in several localities in James City, York, and Gloucester Counties, always in rich marly soil, and in this State as well as farther south it is more or less closely associated with the two preceding species.

Like the first set of three species, the ones just discussed seem to thrive equally well in dry and in moist situations; and here, too, the temperature relations are contradictory. It is often held by ecologists that calcareous (circumneutral) soils, which are clearly favored by these three orchids, are relatively warm,[9] and this may be the case in some places. Finding certain tropical plants on isolated shell-mounds (where the soil is circumneutral) in central peninsular Florida, Small[10] suggested that heat in the spaces between the shells enables these plants to withstand cold spells. Exactly the reverse conclusion, however, could be reached elsewhere in Florida. On the circumneutral Aspalaga bluffs of the Apalachicola River many northern plants grow in isolated colonies far south of their normal areas, and here it would

[7] GRONOVIUS, *Flora Virginica*, ed. 2. 137. 1762.
[8] GRIMES, Rhodora **24**: 149. 1922.
[9] SALISBURY, Journ. Ecology **8**: 208. 1921.
[10] SMALL, Journ. N. Y. Bot. Gard. **28**: 10. 1927.

have to be argued that coolness in spaces between the shell fragments enables them to withstand Floridian heat-waves. In Virginia, moreover, the ravine-bottoms preferred by the three warmth-loving orchids are about the coolest situations on the Coastal Plain. Their isolated distribution northward, however, can be simply interpreted by the same theory of reaction-control applied in the case of the other set, to the effect that they best obtain the nutriment they require in circumneutral soils, and beyond their normal areas can withstand the unfavorable environment only in the restricted localities where such soils are prominent.

It is inferred then, that in the cases of these six orchids, and by analogy in those of hundreds of other plants which show similar distribution-relations, the chief reason for isolation beyond the normal areas is not physical (moisture or temperature) but chemical (reaction —acidity or alkalinity).

ETHNOBOTANY.—*Remedial plants of Tepoztlan: A Mexican folk herbal.*[1] ROBERT REDFIELD, University of Chicago. (Communicated by JOHN R. SWANTON.)

The present writer, who is not a botanist, has done little more than collect the plants listed below and the accompanying ethnobotanical data.[2] The identification of the plants was made by Mr. Paul C. Standley, of the United States National Museum; the Compositae were identified by Dr. S. F. Blake of the Department of Agriculture. To these gentlemen the writer is deeply indebted, and especially to Mr. Standley for further assistance and advice on pre-Linnean descriptions of Mexican flora. A further obligation is owed to Mr. Donald C. Peattie, of Rosslyn, Virginia, who placed the plants in their proper families and furnished botanical notes.

The extensive ethnobotanies which have been collected among primitive peoples testify to the high degree of completeness with which many such peoples have explored their flora. To most primitive peoples no other aspect of the natural environment is as well known. Such knowledge is not, of course scientific. It is unreflective and unsystematized, growing empirically, and never entirely dissociated from magical art. The village populations of Mexico are composed no

[1] Received February 15, 1928.

[2] This was done in the course of an ethnological study of a Mexican village, made possible by a fellowship granted in 1926–27 by the Social Science Research Council.

longer of primitive (tribal) peoples, but of a folk to whom literacy is not unknown. City ways, much diluted, reach such villages, and city cures for rationally comprehended diseases. An interesting problem in such a village lies in the extent to and manner in which the ancient folk medicine loses ground at the expense of modern treatment, and the effect this has in causing old magical behavior to disappear.

No beginning is made on such a problem in this paper, which is no more than a catalogue of some herbal remedies in use in Tepoztlan, State of Morelos, Mexico. This town was a pueblo of the Tlahuicas, a Nahuatl-speaking tribe closely allied to the Aztecs. Its name occurs in the Mendoza[3] and Magliabecchi[4] codices, and first appears in post-columbian history in the account of Bernal Diaz del Castillo.[5] Although less than fifty miles from Mexico City, Tepoztlan is still populated by people almost entirely Indian in blood. Both Nahuatl and Spanish are spoken.

It happens that Francisco Hernandez, physician to Philip II and traveler in Mexico in the sixteenth century, a man of both medical and botanical interests, visited Tepoztlan. At least it is true that a good many plants in his list[6] are described as growing at or near Tepoztlan, Yautepec or Cuernavaca—a cluster of villages in northern Morelos. The writer hoped to be able to compare the uses which Hernandez gave for plants collected three centuries ago in this region with present uses in Tepoztlan, but it proved impossible to identify more than a few on Hernandez's list with plants on the list given below. Some ancient remedial uses probably survive, as do certainly some ceremonial uses (as, for example, decoration of altars with *Plumeria*, still called *cacaloxochitl*, and ceremonial use of *Tagetes*, called *cempoalxochitl*).

The folklore of present-day Mexico is a close compound of Indian and early Spanish elements. Most of the plants in the following list are indigenous to Mexico, but a few have been introduced from Europe. Such plants are *Ruta graveolens* L., *Ricinus communis* L., *Malva parviflora* L., *Peucedanum graveolens* (L.) Benth. & Hook., *Anagallis arvensis* L., *Borago officinalis* L., *Chrysanthemum parthenium* (L.)

[3] *Plate 9* of the Kingsborough reproduction.

[4] Commentary to Section 62.

[5] *The conquest of New Spain* (Hakluyt translation), Book 10: (chap. 144) p. 67.

[6] FRANCISCO HERNANDEZ: *Cuatro libros de la naturaleza y virtudes de las plantas de la Neuva Espana*. Ed. by Peñafiel, Morelia, 1888 (first translated into Spanish and printed in Mexico in 1615).

Bernh., the pomegranate and the citrus fruits. These enter into the herbal pharmacopœia of Tepoztlan today, and into remedies that have precolumbian sources; but in no case, except perhaps *Ricinus communis* L., does such an introduced plant bear a Nahuatl name. No doubt the Spaniards introduced new ways of using wild plants as remedies, and no doubt they seized upon native species resembling those with which they were familiar, and instructed the Indians in their use.

But in the large the folk medicine of such a Mexican village as Tepoztlan is probably more Indian than European. The Aztecs particularly had a vast knowledge and practice of herbal medicine. The extensive list of Hernandez and the frequent references in Sahagun and the other early writers testify to this, as does equally the great body of plant lore of the contemporary Mexican population. Among the Aztecs there was something of a systematic view of disease and its treatment; there was more than one deity presiding over special forms of sickness, that had to be propitiated.

The information embodied in the following list was obtained largely from one informant, a woman of middle age. She had had a little schooling, but her life was one entirely without influence of the written word; she represented the average run of folk-culture of the town. From her were obtained the names and uses of one hundred and five local medicinal plants. (About half of these descriptions were identified with botanical names and appear below.) It is clear that the information of this one person was by no means exhausted. Yet her knowledge was probably not unusually great; she did not assume to be a *curandera* (*Tepahtiani*); as she put it, she did not "know how to boil" (*sabe hervir*). Many of her ethnobotanical items were checked against the knowledge of other persons; sometimes additional but very rarely contradictory information was obtained. The folk knowledge of the village is fairly consistent.

In the list below the Spanish name precedes the Nahuatl term for each plant. A dash in either position indicates that the informant knew no equivalent in the other language. The Nahuatl names, transcribed by a person without phonetic training, probably contain errors. The aspirate or fricative following a vowel which Spanish grammarians indicate with the *saltillo* accent is here indicated with the letter "h." An asterisk indicates that no actual specimen was identified but that the plant is sufficiently notorious to be included.

SELAGINELLACEAE

1. SELAGINELLA CUSPIDATA Spring.

——— *Tepechayohtli* ("chayote of the mountains"). A boiled infusion of this plant is taken internally for a disease of pregnancy known as *necaxanilli* ("loosening" of the female organs), in order, it is said "to fix the placenta."

AMARYLLIDACEAE

2. *POLIANTHES (TUBEROSA L.)

Azucena. Omixochitl. This plant does not grow in Tepoztlan, but is imported to combine with a species of *Laelia* for a use described under the next following name. The plant is probably the same as that known under this name to the ancient Aztecs. The name means "bone flower" and refers perhaps to its color.

ORCHIDACEAE

3. LAELIA *sp.*

——— *Tzacxochitl.* The pseudobulb of this plant is ground with that of *Polianthes* and boiled with sugar and chocolate. The resulting potion is taken by a pregnant woman to prevent the abortion which would otherwise follow when she conceives a sudden appetite that she is unable to satisfy. "All of a sudden she wants to eat something; she cannot get it; so she takes *tzacxochitl* so that the child does not fall."

The plant does not grow in Tepoztlan itself, but is obtained from the *tezcal*, a rocky area on the slopes of the mountain.

URTICACEAE

4. PARIETARIA PENNSYLVANICA Muhl.

Tripa de Judas. Tepanzozmahtli. Relatives of this plant, some of which are doubtless called by this same Spanish name, "the guts of Judas" are eaten as greens in Europe. In Tepoztlan the entire plant is eaten, boiled, as a remedy for "internal inflammations." It also enters into remedial compounds; one such is described below under no. 60, *Chrysanthemum parthenium* (L.) Bernh.

AMARANTHACEAE

5. IRESINE INTERRUPTA Benth.

——— *Tlatlancuaye.* The plant is ground up and steeped with other herbs and placed on the lungs and abdomen to reduce the fevers. One such recipe includes rose leaves, wine and coriander.

PAPAVERACEAE

6. BOCCONIA ARBOREA S. Wats.

Gediondillo. ——— A piece of the leaf is plastered on the temple with soap to cure headache. Other plants are sometimes used, and quite commonly a patch of porous plaster.

CRUCIFERAE

7. LEPIDIUM DENSIFLORUM Schrad.

Lantejilla.——— As with other crucifers, the stinging taste of this plant probably suggested its local use. It is steeped in alcohol and placed on the chest to cure a cold.

LEGUMINOSAE

8. CAESALPINIA PULCHERRIMA (L.) Swartz.

Flor de camaron. ——— This plant of wide distribution, known in English-speaking countries as "Barbados Pride." "Flower Fence," "Dwarf Poinciana," etc., is known in Tepoztlan as "shrimp flower." The leaves are boiled with the flowers of the *cabellito de angel* tree (probably *Ceiba pentandra* (L.) Gaertn.), with manzanillos, raisins, licorice and a fragment of armadillo shell to prepare a remedy, applied externally, for whooping cough.

9. CASSIA LAEVIGATA Willd.

Guajillo. Yehcapahtzin. The meaning of the Nahuatl term is "wind-medicine." Perhaps this is in reference to the fact that it is used for troubles of the respiratory tract. The plant is ground in alcohol with *Senecio salignus* DC., and the infusion rubbed on the chest.

10. ERIOSEMA GRANDIFLORUM (S. & C.) Seem.

Guayabillo. ——— An infusion of the leaves is used to wash sore feet.

11. MUCUNA sp.

Ojo de venado. ——— The seed of this tree, its appearance suggesting the local name "deer's eye," is widely worn in Mexico as a charm. The tree does not grow in Tepoztlan but the seeds are imported for sale. In many parts of Mexico the seeds are worn as a charm against the evil eye, but in Tepoztlan they are worn to keep off the evil spirits of the air that cause the disease generally known by the same name, *los aires*, or, in Nahuatl, *Yehyecahuiliztli*. These evil spirits (*yehyecatzitzin*), are an important cause of disease in Tepoztlan, and besides the numerous herbal treatments which appear in this list for troubles so caused, there are many ritualistic treatments, as well as an elaborate technique for propitiating the malevolent spirits. The *Mucuna* seeds are generally perforated, and bits of colored yarn are put through the holes. Bright-colored yarn is commonly employed in many connections to propitiate *los aires*.

RUTACEAE

12. RUTA GRAVEOLENS L.

Ruda. ——— This European plant with widespread popular remedial associations was introduced into Tepoztlan together with its therapeutic reputation. A recipe there collected provides that the plant be boiled with *Salvia microphylla* H. B. K. and an unidentified plant, apparently a mint (according to Standley), called locally *poleo del monte* or *huatlaxictzi*. The infusion is taken for abdominal pains. The plant is also used to wash persons affected by *los aires* (described under no. 59, *Piqueria trinervia* Cav.).

13. CITRUS AURANTIFOLIA (Christm.) Swingle.

Flor de limon. "Limonxochitl." Lime flowers boiled in water with cinnamon and sugar added form one of the many remedies for a disease known as *la mohina* (fretfulness; peevishness). This disease is characterized by persistent anger or ill-temper. There are a number of such strong emotional states which are considered and treated as diseases in rural Mexico. In *la mohina* various warm flavored drinks are given to soothe the patient.

MALPIGHIACEAE

14. THRYALLIS GLAUCA (Cav.) Kuntze.

——— *Xaxaxacotic.* This plant, together with *Hypericum pratense* Schlecht and two unidentified plants known as *huitlatenaxihuitl* and *ihilacatzihuitl*, is boiled and administered to pregnant women suffering from a dis-

ease called *costumbre blanca* ("white menses") or *iztaccocoliztli* ("white sickness"). This remedy is also administered for the different sickness known as *necaxanilli*, referred to under no. 1, *Selaginella cuspidata* Spring.

EUPHORBIACEAE

15. *RICINUS COMMUNIS L.

Digerillo. Axaxaxoxihuitl. The leaves are boiled and administered internally for fevers. The informants knew no remedial use of the seeds, but said that the flowers, when dry, are pressed and the oil extracted for burning.

ANACARDIACEAE

16. SCHINUS MOLLE L.

Pirun. ——— This common tree, introduced from Peru, enjoys a wide variety of local names and usages, both curative and culinary, in Mexico.[7] In Tepoztlan, among other uses, the leaves are steeped in water and applied to parts of the body affected with rheumatism.

MALVACEAE

17. MALVA PARVIFLORA L.

Malvas. ——— This plant, of European introduction and folk medicine, is boiled with *Piqueria trinervia* Cav., *Verbena polystachya* H. B. K., and a rose known as *rosa de Castilla*, and the infusion taken internally for fevers.

18. MALVAVISCUS CONZATTII Greenm.

Flor de molenillo. Atlatzompililli. This plant enters into recipes for cough medicines. It is boiled with *Caesalpinia pulcherrima* (L.) Swartz, and a piece of armadillo shell, both of which are often used in other combinations to treat coughs.

GUTTIFERAE

19. *MAMMEA AMERICANA L.

——— *Pitzli.* This word means simply "kernel." It is more particularly applied to the stone of the mamey which, ground, enters into cathartic compounds in Tepoztlan.

HYPERICACEAE

20. HYPERICUM PRATENSE Schlecht.

Sangrinaria. ——— European relatives of this plant are rich in folk associations. In Tepoztlan the Mexican plant is an ingredient in the remedy described under no. 14, *Thryallis glauca* (Cav.) Kuntze.

CACTACEAE

21. HELIOCEREUS SPECIOSUS Britton & Rose.

——— *Ahuaxochitl.* The name, meaning simply "thorn-flower," was doubtless applied to many cacti. The flowers of this species are boiled, and the infusion taken internally for colds.

[7] PAUL C. STANDLEY. *Trees and shrubs of Mexico.* Contr. U. S. Nat. Herb. **23**: 661. 1923.

LYTHRACEAE

22. HEIMIA SALICIFOLIA (H. B. K.) Link.

Yerba jonequil. Xonecuilli. This herb is ground up in alcohol and applied very hot for rheumatism, as one takes the steam-bath in the *temazcal*, (the pre-Columbian sweat-house still in general use throughout rural Mexico.) Hernandez has a "*xonecuilpahtli*" which he says was used as a remedy for colds, but it is not possible to identify his description.

PUNICACEAE

23. PUNICA GRANATUM L.

Granada. ——— The leaves of the European pomegrante are used as a wash for the lips when they are affected by a disease characterized by whiteness of the lips and known as *camapalaniliztli* ("rotten mouth"). The leaves of the guayaba (*Psidium guajaba* L.) are added and both roasted and ground before making the infusion.

OENOTHERACEAE

24. OENOTHERA MEXICANA Spach.

Yerba del golpe. ——— As its name indicates, this plant is used for bruises. An infusion is made and minor lesions are washed in it.

UMBELLIFERAE

25. PEUCEDANUM GRAVEOLENS (L.) Benth & Hook. (Syn: *Anethum graveolens* L.)

Hinojo. ——— This European plant forms an ingredient in recipes for remedies taken internally to reduce restlessness during fevers. In one such recipe the following are boiled together with this plant: *Flor de tilia* (*Tilia* sp.); *flor de manita* (not identified); *flor de nacahuite* (*Solanum fontanesianum* Dunal); *la peonia* (*Peonia* sp.); nutmeg; cinnamon; and magnesia powder.

PRIMULACEAE

26. ANAGALLIS ARVENSIS L.

Coralillo. ——— The leaves of this European plant are boiled and applied to inflammations.

OLEACEAE

27. *FRAXINUS sp.

Fresno. ——— The leaves of the ash are mixed with wine and applied as a poultice for headache.

LOGANIACEAE

28. BUDDLEIA SESSILIFLORA H. B. K.

Lengua de vaca. Pahtlaxoxoctic. The Nahuatl name of this plant means "green medicine." It is common in Tepoztlan and used for a variety of ailments.[8] The leaves are applied to the lungs to reduce fever. Mixed with suet the leaves are applied to the gums as a poultice for toothache. The plant also has a (probably purely magical) use in connection with cookery. Tortillas are cooked on a flat clay griddle, the *comal*. Some of the leaves of this

[8] As elsewhere in Mexico. See STANDLEY, Contr. U. S. Nat. Herb. **23**: 1145. 1924.

plant are ground in *nejacole* (*nexacotl* or *nexatl*—the water in which corn is cooked with lime). Lime is added to these ground leaves and the preparation rubbed on both faces of the *comal* the first time the *comal* is used. Otherwise it is said the *comal* would break. Sometimes, when the *comal* is used thereafter, the preparation is rubbed on the upper face only.

POLEMONIACEAE

29. BONPLANDIA GEMINIFLORA Cav.

——— *Tetzotzo.* This plant is boiled together with *Solanum nigrum L.*, and the infusion taken as a purge. *Verbena polystachya* H. B. K. may also be added.

30. LOESELIA MEXICANA (Lam.) Brand.

Espinoncillo. ——— This plant does not grow in Tepoztlan but is brought in from near by Cuernavaca. The leaves are boiled and the infusion taken as a purgative in fevers.

HYDROPHYLLACEAE

31. WIGANDIA KUNTHII Choisy.

Flor de chichicascle. Tzitzicaztli or *pahpatlanuac.* The leaves are ground and boiled and the infusion taken for abdominal pains.

BORAGINACEAE

32. BORAGO OFFICINALIS L.

Boraja. ——— This European plant is steeped in water and the infusion drunk to cool fevers.

33. TOURNEFORTIA DENSIFLORA Mart. & Gal.

Yerba rasposa. ——— The leaves are rubbed on blisters. The scabrous character of the leaves suggests a counter-irritant.

VERBENACEAE

34. VERBENA POLYSTACHYA H. B. K.

Yerba de San Jose. Zanhuanaxictzi. The Nahuatl name of this plant is of course a hybrid term. It is puzzling to find a plant referred to in one of two idioms in current use as Saint Joseph's plant and in the other as the plant of Saint John. A use is described in connection with no. 17, *Malva parviflora* L.

35. LIPPIA DULCIS Trev.

Yerba dulce. ——— Widely known in Mexico under this name, in Tepoztlan the plant is boiled with the flowers of a tree, probably *Ceiba pentandra* (L.) Gaertn., (known as *cabellito de angel* or *xiloxochitl*), and manzanillos to make a remedy applied externally for coughs.

LABIATAE

36. OCIMUM MICRANTHUM Willd.

Albahaca. ——— A little of this mint is placed in the ear to stop earache.

37. SALVIA MEXICANA L.

——— *Tlapachichin.* A use of this plant is described under no. 54, *Viguera grammatoglossa* DC.

38. SALVIA MICROPHYLLA H. B. K.

Mirto. ——— A use of this plant is described in connection with no. 59, *Piqueria trinervia* Cav.

39. HEDEOMA PIPERITA Benth.

Tabajillo ——— This plant is boiled with brown sugar and the liquid taken internally for abdominal pains.

SOLANACEAE

40. NICOTIANA TABACUM L.

Tabaco cimarron. Cuahuihitl. The Nuhuatl form given in Simeon's dictionary and elsewhere is *cuauietl*, but the local informant gave the form indicated above. The remedial use in Tepoztlan is of a boiled infusion as a wash to the abdomen for abdominal pains.

41. SOLANUM FONTANESIANUM Dunal.

Flor de nacahuite. Nacahuixochitl. The plant is boiled and the liquid taken internally for cough.

42. SOLANUM MADRENSE Fernald.

Flor de clamaclancle. Tlamatlantli. This plant, boiled and mixed with alcohol, is used as a remedy when a nursing baby vomits. The mother washes her breasts with the preparation and also takes a little internally. Then the child is allowed to nurse. A suggestion by the informant that the trouble came from teething tempts the writer, inexperienced in Nahuatl etymologies, to derive the local name from a Nahuatl root meaning "to quiet" and the word *tlantli* (teeth).

43. SOLANUM NIGRUM L.

Yerba nora. Tohonechichi. Both the Spanish and the Nahuatl names are common in Mexico for species of *Solanum*. This one in Tepoztlan is boiled and mixed with alcohol and applied externally for inflammations and swellings. It is also used as a wash to cool fevers.

44. DATURA CANDIDA L.

Florefundia (*Florepondia*) or *Bomba.* ——— The petals are coated with grease and placed on the gums to alleviate toothache.

45. *LYCOPERSICUM ESCULENTUM Mill. (Syn: *Solanum lycopersicum* L.)

Jitomate. Xitomatl. An infusion of tomato leaves is applied to granular eruptions.

SCROPHULARIACEAE

46. CASTILLEJA ARVENSIS C. & S.

Saumyate. Catoxictzi. European species also have uses in folk medicine. The Tepoztlan use is described in connection with no. 59, *Piqueria trinervia* Cav.

ACANTHACEAE

47. JACOBINIA SPICIGERA (Schl.) Bailey.

Muicle. ——— This name is apparently a corruption from Nahuatl, but the informants regarded it simply as a Spanish term. Standley[9] gives several Mexican remedial uses and also mentions its employment as a dye. In Tepoztlan the plant is boiled in water with sugar and taken by pregnant women. It is one of a number of plants which are collected and brought to Mexico City to sell there.

CAPRIFOLIACEAE

48. SAMBUCUS MEXICANA Presl.

Sauca. ——— A use of elder is indicated under no. 55, *Bidens leucantha* (L.) Willd.

[9] STANDLEY. Contr. U. S. Nat. Herb. 23: 1345. 1926.

COMPOSITAE

49. SENECIO. sp.

Lechugilla. Palancapahtli. This plant is boiled with the stone of the mamey, and with the yellow elder, *Tecoma stans* (L.) H. B. K., and an unidentified plant known as *sacasili*, and the resulting infusion taken internally by children suffering from constipation or indigestion.

50. SENECIO SALIGNUS DC.

Jarilla. Ac-chayatl. This plant, ground in alcohol, is combined with *Cassia laevigata* Willd. The infusion is applied externally for respiratory diseases. Standley[10] gives this same local name for the Valley of Mexico, and mentions several remedial uses.

51. TAGETES FLORIDA Sweet.

Pericón. Teyatli. The aromatic plants of this genus make them particularly eligible for folk-medicinal uses. In Tepoztlan the flowers of this species are steeped in water and the infusion used to wash new-born babies during the week after birth. At this time the mother bathes in the *temazcal*, the indigenous sweat-house of stone. If no *temazcal* is available, she may instead wash herself with this infusion.

52. TAGETES ERECTA L.

Simpasuchi. Cempoalxochitl. The "African" marigold of our gardens is the well-known "flower of the dead" of the ancient Aztecs. The plant is widely known throughout Mexico under some modification of the original Nahuatl name, still in use in Tepoztlan. The plant is frequently mentioned under this name in the sixteenth century writings. It was used by the Aztecs to decorate altars and as a part of floral offerings to certain gods. It still has such ceremonial-religious uses in Tepoztlan.[11] It is also used remedially, the flowers being boiled and the infusion drunk for stomach troubles.

53. ALOMIA ALATA Hemsl.

Yerba de Santa Maria. Zohuapahtli. The Nahuatl name, an ancient one applied no doubt to other plants, suggests a remedy for female ailments ("woman medicine"). The use cited in Tepoztlan is of the plant ground and taken in a cup of alcohol with sugar and egg for palpitations.

54. VIGUIERA GRAMMATOGLOSSA DC.

——— *Acahual.* An infusion of the plant is applied to the chests of children suffering from respiratory diseases, such as croup. The other ingredients named are lemon flowers and *Salvia mexicana* L.

55. BIDENS LEUCANTHA (L.) Willd.

——— *Tzitziquilitl.* This plant, together with *Sambucus mexicana* Presl., forms an ingredient in a remedy for eye troubles. The two plants are boiled up with some raisins and the umbilical cords each of a boy and of a girl. For this remedial use umbilical cords in Tepoztlan are not buried as in some other Mexican villages, but kept. "They are worth twenty-five centavos." The presence of the umbilical cords in the remedies is due to a magical application of the fact that an important trouble of the eyes occurs in babies (no doubt *ophthalmia neonatorum*). It is supposed to be caused by the approach to the baby of someone who has recently had sexual intercourse.

56. STEVIA MICRANTHA Lag.

——— *Calpancatoxictzi.* The plant is boiled, mixed with alcohol, and taken internally as a remedy for those ailments thought to be caused by the evil spirits of the air (*los aires*, already referred to under no. 11, *Mucuna* sp.).

[10] STANDLEY. Contr. U. S. Nat. Herb. **23**: 1627. 1926.

[11] As in many other Mexican communities. See, for example, FREDERICK STARR. *Notes on the ethnography of Southern Mexico.* Proc. Davenport Acad. Sci., **8**: 28.

57. CALEA ZACATECHICHI Schlecht.

Prodigiosa. Ahuapahtli. The plant is boiled and the infusion beaten up with egg and sugar and drunk for biliousness. Hernandez lists a plant with the same name, of undetermined identity, used at that time for similar ailments.

58. BACCHARIS sp.

Popote. Popotl. The roots are steeped in alcohol and placed on the gums to relieve toothache.

59. PIQUERIA TRINERVIA Cav.

Harta reina or *Alta reina.* ——— This plant forms a frequent ingredient in mixtures of herbs used in washing the body (it may also be taken internally) of a person afflicted by *los aires*, the evil spirits of the air already referred to. *Los aires* are found wherever there is water—near ravines, springs, fountains or water-tanks. A person going to such a place to wash or bathe may offend these spirits and in return be visted with a variety of complaints, of which the most characteristic are pustular eruptions and paralysis. Treatment of this disease—for the wide range of possible symptoms does not prevent if from being regarded as one disease, a visitation,—is in part accomplished by conciliation of the spirits through gifts and in part by treating the patient. The essential element of this treatment is washing with herbs. There are probably many recipes for such herbal compounds, the most used in the entire Tepoztlan pharmacopœia. This plant is almost invariably included. One such compound includes *Salvia microphylla* H. B. K., *Castilleja arvensis* C. & S., egg, and an unidentified plant known as *arretillas* or *pipiloxihuitl*. *Piqueria* is also employed for fevers (see under no. 17, *Malva parviflora* L.). The leaves may be used to wash a child afflicted with *el daño* (see under no. 60, *Chrysanthemum parthenium* (L.) Bernh.).

60. CHRYSANTHEMUM PARTHENIUM (L.) Bernh.

Alta mesa. ——— This European plant, generally known as feverfew in United States gardens, receives its local name from a corruption of *altamiza.* Its European folk reputation came with it to Mexico. In Tepoztlan the plant is common. It is cooked with *Parietaria pennsylvanica* Muhl. to form a remedy administered internally to children afflicted with *el daño. El daño* (the hurt; the injury) bears the Nahuatl name of *oquitzahtzitihque* ("making them cry"). It is the local form of the evil eye. When people with "bitter hearts" (*yolchichihque*) look upon children and praise them, the children begin to cry and can not be comforted until some one or another of the accepted remedies, some herbal, some ritualistic, is applied.

PROCEEDINGS OF THE ACADEMY AND AFFILIATED SOCIETIES

PHILOSOPHICAL SOCIETY

965TH MEETING

The 965th meeting, constituting the 57th annual meeting, was held at the Cosmos Club December 10, 1927.

The Treasurer reported expenditures of $1318.89 for the year, and stated that the active membership of the Society is 235.

The following officers were declared elected for the year 1928: *President*, P. R. HEYL; *Vice-Presidents*, L. H. ADAMS and W. D. LAMBERT; *Treasurer*, O. H. GISH; *Corresponding Secretary*, E. W. WOOLARD, *Members-at-large of the Council*, N. H. HECK and L. V. JUDSON.

Program: WALTER A. MACNAIR: *Some physical measurements concerning vitamin D.* (The paper is in press in the Journal of Biological Chemistry.)

966TH MEETING

The 966th meeting was held at the Cosmos Club January 7, 1928.

Program: President J. P. AULT: *Ocean surveys—problems and developments.* (Printed in this JOURNAL for March 4, 1928.)

967TH MEETING

The 967th meeting was a joint meeting with The ACADEMY, held at the Cosmos Club, January 19, 1928.

Program: L. B. TUCKERMAN: *Theoretical principles underlying balloting.*

GEORGE H. HALLETT, Jr.: *An appraisal of election methods.*

968TH MEETING

The 968th meeting was held at the Cosmos Club, January 21, 1928.

Program: E. O. HULBURT: *Ionization of the upper atmosphere.* Using laws, either known or based on apparently reasonable assumptions of the gas pressures in the high atmosphere, the ultra-violet light, the recombination of the electrons and ions and their diffusion, the form of the electron bank in the high atmosphere is calculated and found to be in fair agreement with that required by the data of wireless telegraphy for day and night conditions. For a summer day (North Temperate Zone) the maximum density of the electron bank is about 3×10^5 electrons per cc. at a height of about 200 km; the corresponding values for a winter day are about 2×10^5 and 150 km, and for a summer or winter night about 8×10^4 and 100 to 150 km. There is an ion bank below the electron bank, whose maximum density is probably less than 10^5 ions per cc. (*Author's abstract.*)

W. J. ROONEY: *Earth-resistivity measurements and their bearing on the location of concealed geological discontinuities.* A review of the earth-resistivity investigations of the Department of Terrestrial Magnetism, 1924–1927, shows a consistent relationship between the variations of resistivity with depth and the geological structure of the regions surveyed. The possibility of using resistivity determinations to locate certain types of discontinuity in vertical structure is shown by six specific experiments in Washington and in the copper country of Michigan. Results indicating discontinuities at depths beyond 1000 feet have been secured, but independent determinations to con-

firm the resistivity indications are seldom available for depths much greater than 100 feet. Hence the depth limit for practical application of the method is uncertain. Given a fairly uniform lateral distribution of material, resistivity measurements made on the surface will disclose quite accurately the distance to underground water and the depth of overburden, and may be used to determine the thickness of rock strata, provided the rocks differ sufficiently one from the other. In general, sedimentary rocks have fairly low resistivities, 5000 to 20,000 ohms per centimeter cube, while the values for the denser igneous rocks run from five to twenty times higher. The resistivity of soils varies widely with composition and with the amount and character of the solutions they contain. (*Author's abstract.*)

H. E. MERWIN, *Recording Secretary.*

ANTHROPOLOGICAL SOCIETY

598TH MEETING

The 598th meeting was held in the National Museum, October 11, 1926.
Program: Dr. ALEŠ HRDLIČKA, *Explorations in Alaska and northeast Asia.*

599TH MEETING

The 599th meeting was held in the National Museum, November 16, 1926.
Program: Dr. J. WALTER FEWKES, *Elden Pueblo.*

600TH MEETING

The 600th meeting was held in the National Museum, December 21, 1926.
Program: WALLACE THOMPSON, *Appraising the Mexican.*

601ST MEETING

The 601st meeting was held in the National Museum, January 18, 1927.
Program: WARREN K. MOOREHEAD, *Prehistoric moundbuilders.*

602D MEETING

The 602d meeting was held in the National Museum, February 3, 1927.

Program: Mrs. ZELIA NUTTALL, of Coyoacan, D.F., Mexico.—*New light on ancient American calendars.* The speaker reviewed the evidence for her well-known theory of the origin of the Maya and Aztec calendars, first proposed at the Oxford meeting, 1926, of the British Association for the Advancement of Science. As all the centers of ancient American culture are situated within the tropics, the inhabitants had a simple means at hand for learning the true length of the solar year. The sun itself registered it for them, for within this zone the sun passes twice a year through the zenith, causing the striking phenomenon that, for a moment about noon, all vertical objects are shadowless.

Mrs. Nuttall submitted an array of evidence—historical, documentary, archeological, and photographic—to substantiate her conclusion that Mexicans, Mayas, Ecuadorians, Peruvians, and others inhabiting this zone, observed the strange periodical disappearance of shadows and interpreted it as "a descent of the Sun-God." As this descent is always immediately followed by rains caused by the heat of the vertical solar rays, this momentary descent, which marked the advent of the rainy season, was of transcendental importance to the native agriculturists. After this "descent of the god" they could confidently sow the seeds of maize and other food plants with a

certainty of rain. The theory would explain why, as civilization gradually advanced under favorable conditions, this phenomenon, first observed by means of any vertical staff, pole, or stone, led to the erection of pillars, stelae, altars, towers, shrines, and the temples ultimately erected on the summits of pyramidal structures, which were to serve as worthy seats or places of rest for the descending Sun-God and offer constant invitations for him to descend and linger.

603D MEETING

The 603d meeting was held in the National Museum February 24, 1927.

Program: Dr. ALFRED V. KIDDER.—*Cliff-dwellers of Arizona and their predecessors.* The southwestern archaeological field embraces those parts of Arizona, New Mexico, Colorado, and Utah, which contain the remains of the sedentary, agricultural type of Indian, commonly known as Pueblos. The present range of the Pueblo Indian is restricted to the drainage of the Rio Grande and the Little Colorado. Ruins of ancient villages closely similar to those of the historic Pueblos are found throughout a far greater range. They consist of cliff houses, valley towns, and mesa-top dwellings, ranging in size from a half dozen to a thousand rooms. The problem of Southwestern archaeology is the arrangement of these ruins in relative chronological order and the determination of the origin and growth of the culture responsible for them. Until about fifteen years ago the early stages of Pueblo civilization were not recognized. The explorations of the Peabody Museum of Harvard, the Natural History Museum of New York, the National Geographic Society, and other institutions have resulted in the discovery and description of these early stages, the first being the Basket-maker, a phase marked by primitive agriculture, lack of pottery and of stone architecture. This was followed by the Post-basket-maker period which saw the introduction of pottery and the beginnings of masonry construction. The Post-basket-maker was succeeded by the Pre-Pueblo, in which pottery was greatly improved, houses were enlarged and strengthened, and the typical massed type of dwellings first introduced. We are thus now in possession of the outline of the entire growth of the Pueblos from nomadism up.

604TH MEETING

The 604th meeting was held in the National Museum March 17, 1927.

Program: MATTHEW W. STIRLING.—*Recent explorations in Dutch New Guinea.* The interior of the island is largely unknown as it has never been completely mapped or penetrated. The purpose of the expedition under Mr. Stirling's leadership was three-fold: the making of maps; addition to our knowledge of the country; and a study of the peoples inhabiting this region. The expedition was scientifically outfitted, and motor boats and an aeroplane were used as means of transportation. Entrance was effected from the northern coast, thence up the Rouffaer River, to the central range known as the Nassau Mountains, one of the great ranges of the world. The island is inhabited mainly by Papuans, of which three distinct groups were visited: those of the coast, those of the great Lake plain, and those of the Van Reese Mountains. The foothill region, above the Lake plain, is uninhabited for a distance of about thirty miles. After passing this belt, the Negrito pygmy peoples are encountered. The average height of the men is 152 cm, that of the women 145 cm. A permanent camp was established at Tombay, located in the interior of the Nassau Mountains. The peoples

have an advanced system of agriculture, of which the staples are: sweet potatoes, sugar cane, taro root, bananas, and lemons. They have a loose type of clan organization. They are polygamists in theory and monogamists in practice. They believe in some form of immortality, but their religious concepts were hard to investigate, as they were very reluctant to discuss anything concerning these matters. The pygmies bury their dead, while the Papuans practise platform burial near the home of the deceased.

605TH MEETING

The 605th meeting was a joint meeting with The ACADEMY and was held in the assembly hall of the Cosmos Club April 21, 1927.

Program: Dr. FREDERICK W. HODGE, of the Museum of the American Indian (Heye Foundation).—*The Zuni Indians of New Mexico.* (To be published in the Proceedings of The ACADEMY, This JOURNAL, vol. 18, 1928.)

606TH MEETING

The 606th meeting was held in the National Museum, October 25, 1927.

Program: Dr. JOHN M. COOPER.—*Field notes on northern Algonkian magic and divination.* In order to determine the limits of western extension of a number of culture traits that are characteristic of the Tête de Boule and Montagnais-Naskapi tribes of Quebec and Labrador, the speaker undertook last summer, 1927, a reconnaissance of the Cree and northern Ojibwa bands of the southern and western James Bay region and of the Albany River area. The belt covered extended about a thousand miles westward of the St. Maurice River to the source of the Albany River and averaged about two hundred miles in breadth. Scapulimancy, or divination by the marks and cracks on flat bones held against the fire, was found to extend continuously from the St. Maurice section to half way up the Albany, and an apparently reliable report was obtained of its occurrence as far west as the country north of Lake of the Woods. Scrying, or divination by peering into water in a dish or into some substitute therefore, was found universally distributed throughout the area studied. Other types of divination, common especially in the eastern half of the area, are those carried out with otter carcasses or otter paws, with beaver haunch bones, with beaver shoulder blades, with bear skulls, and with grouse wishbones. Foetal inclusions are universally used in hunting-magic, as are also singing and drumming for game. The caribou bezoar is used in the eastern section of the area. To bring the north wind, the buzzer, the bull-roarer, and the snow man are resorted to. A number of cradle charms are used, particularly the bit of navel string attached to the cradle bow. The cylindrical or barrel-shaped conjuring tent, that has been reported from various points from northern Labrador to Minnesota, was found of universal extension over the whole belt studied, as was also the whole conjuring complex that is associated with this very distinctive type of tent. In fact, throughout the whole belt is found a culture fundamentally identical in all its features, material and social, with only minor local differences.

607TH MEETING

The 607th meeting was held in the National Museum November 22, 1927.

Program: FRANK H. H. ROBERTS, JR.—*A late Basket-maker village in the Chaco Canyon.* A late Basket-maker village consisting of 18 houses, 48 storage bins and a kiva excavated in the Chaco Canyon, New Mexico,

during the summer of 1927, by Mr. Roberts, has given considerable information as to the house-type of the period. In general, the crude, one-room domicile consisted of an oval or rectangular excavation, two and one-half to three feet deep, 12 to 14 feet in diameter, roofed over with a pole, brush, and plaster superstructure. The earth walls of the excavation were lined with large stone slabs which in turn were covered with adobe plaster. Four posts set in the floor a short distance from the walls supported the superstructure. These posts carried a rectangular framework against which the upper ends of small poles, the lower ends of which were embedded in the earth around the periphery of the excavation, were placed. The latter formed the sloping upper walls of the house. The rectangular space at the top probably had a flat roof with an opening in the center to serve as a smoke hole, possibly on occasions as an entrance. The entire wooden structure was then covered with twigs, bark, leaves, earth, and plaster. In the center of the room was an oval or rectangular firepit on the north side of which was a small, circular hole which is probably analogous to the sipapu of kivas. Most of the houses appear to have had an entry way on the south or southeast side. The doorway of the main room gave access into a short passage which in turn opened into a small oval room. The ante-chambers of these domiciles are quite suggestive of the entry-ways into earth lodges built by modern Indians, by the Eskimo, and even by the Palaeo-Asiatic peoples. The kiva was constructed of slabs in much the same fashion as the dwellings. The inner circle, forming the face of the bench was of smaller slabs than the outer or wall of the room. The diameter above the bench was 40 feet and inside the bench 36 feet. There was a central firepit, a deflector on the south side, but no other features in the room. The roof was supported on four large posts. It is quite possible that in this structure is to be seen the predecessor of the great kivas of the Chaco pueblo cultures. Burials were scattered throughout the village. Skeletal remains showed a group of people with long heads, undeformed. There were very few mortuary offerings. Bowls accompanied three of the interments while the other graves had no funerary furniture.

JOHN M. COOPER, *Secretary*

THE GEOLOGICAL SOCIETY

431ST MEETING

The 431st meeting was held in the Auditorium of the Interior Department Building, November 2, 1927, President BUTTS presiding.

Program: Professor D. J. MUSHKETOV, Director of the Russian Geological Survey: *Recent geological investigations in Turkestan.*

432ND MEETING

The 432nd meeting was held at the Cosmos Club, November 23, 1927 President BUTTS presiding.

Program: Professor L. W. COLLET, Geneva University: *The structure of the Alps.*

JOINT MEETING

A joint meeting of the Society and the ACADEMY was held at the Cosmos Club, December 7, 1927, President WETMORE of the ACADEMY presiding.

Program: Captain M. E. ODELL, of Toronto, Canada: *Scientific aspect of the Mount Everest expedition.*

433RD MEETING

The 433rd meeting was held at the Cosmos Club, December 14, 1927, President BUTTS presiding. The Secretary announced the death of MILTON WHITNEY, SAMUEL SANFORD, FRANK SPRINGER, and I. C. WHITE. Vice-president HEWETT took the chair during the presentation of the address of the retiring president.

Presidential Address: *Variations in Appalachian stratigraphy.*

THIRTY-FIFTH ANNUAL MEETING

The thirty-fifth annual meeting was held at the Cosmos Club after the adjournment of the 433rd meeting, President BUTTS presiding.

The annual report of the secretaries was not read. The Treasurer presented his annual report showing an excess of assets over liabilities of $1,139.36 (book value) on December 10, 1927. The auditing committee reported that the books of the Treasurer were correct.

The results of balloting for officers for the ensuing year were as follows: *President:* D. M. HEWETT; *Vice-Presidents:* S. R. CAPPS, G. R. MANSFIELD; *Treasurer:* H. G. FERGUSON; *Secretaries:* W. W. RUBEY, A. A. BAKER; *Members-at-Large-of-the-Council:* W. F. FOSHAG, M. I. GOLDMAN, J. B. MERTIE, JR., C. P. ROSS, W. T. SCHALLER; *Nominee as Vice-President of Washington Academy of Sciences representing the Geological Society:* CHARLES BUTTS.

W. P. WOODRING, W. W. RUBEY, *Secretaries.*

SCIENTIFIC NOTES AND NEWS

C. E. DOBBIN has been transferred from the Fuel Section of the Geologic Branch to the Conservation Branch of the Geological Survey, of which he is to be field representative of the mineral classification division, with office in Denver, Colorado.

The Petrologists' Club met with the Geological Society on February 28 at the National Museum. Special features of the geological, paleontological, and mineralogical collections were shown by Messrs. MERRILL, GILMORE, FOSHAG, BASSLER, and other members of the Museum's staff.

A paper by Miss FRANCES DENSMORE on the music of the North American Indian was presented before the Academy of Athens, Greece, on March 23.

PAUL C. STANDLEY returned to Washington April 2, after spending four months in botanical field work in Honduras. Most of his time was devoted to a survey of the Lancetilla Valley, near Tela, but three weeks were passed in exploration of the pine forests of the interior of the Republic.

The Baltimore-Washington Section of the American Ceramic Society met at the Olmsted Grill on March 31. Program: L. J. TROSTEL, of the General Refractories Company: *The technical control in the manufacture of refractories;* A. N. FINN, of the Bureau of Standards: *The value of the chemist in the ceramic industry.*

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